FOOD AND DIGESTION

IN

HEALTH AND DISEASE

KIMPTON'S PUBLIC HEALTH SERIES

FOOD AND DIGESTION

IN

HEALTH AND DISEASE

DURING

INFANT, CHILD, AND ADULT LIFE

WITH AN INTRODUCTION ON

THE NATURE OF MATTER AND THE PHENOMENA OF LIFE AND AN ACCOUNT OF THE SOURCE, PROPERTIES AND INFLUENCE OF

WATER

BY

M. A. DUTCH, M.D.

Diplomate in Public Health and Sanitary Science, University of Cambridge;
Fellow of the Royal Institute of Public Health, London, etc., etc.

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HENRY KIMPTON
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PREFACE

THE subject of food and its influence on man has in every age attracted more attention than any other branch of Hygiene, though it has seldom been treated in anything like a full manner, except by the authors of large text books on dietetics, for many of the smaller books extant are devoted to the purpose of either promulgating special doctrines or recommending certain régimes. I trust, therefore, I am justified in submitting this little treatise to notice, and as I have used my best efforts to give as unbiassed an account, and as accurate and widespread a survey, as space would permit, of the principles which govern "Food and Digestion in Health and Disease," I hope it may merit some favourable attention and supply a want which I think to be needed.

I have further thought well, in view of the difficulty of conveying a fairly accurate and useful knowledge of the chemical processes concerned, to include an introductory chapter which refers to the "Nature of Matter" and the "Phenomena of Life." Indeed, it is perfectly

futile for one to hope to acquire a logical conception of the physiological changes which persist in the body, so long as human existence prevails, unless, at least, a rudimentary study is made of these subjects. To facilitate the correct interpretation of the technical terms I have used, in the sense I desire; and to add to the educational value of that which I have written, I have also included a short glossary. This I trust may be found of service not only to Nurses, and those whose duties bring them into association with invalids, but also to others interested in the subject of "Public Health."

LINDEN HOUSE,
197 WALM LANE,
CRICKLEWOOD, N.W.
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and conditions to which malnutrition gives rise. With them, tea (often stewed) takes the place of alcohol, to lessen their bodily waste and quiet their hunger.

Our young men are not much better off, for many, engaged in commercial and other pursuits, fast upon a hastily snatched breakfast, and an insufficient mid-day meal until evening, when they are either too fatigued to eat, or else so famished that they overload their stomachs with food. For them, a smoke, by the way, takes the place of alcohol or tea, to stimulate their senses and narcotise their hunger.

As for those people who are compelled to "keep up an appearance" upon a limited income —how they live, none but themselves can e'er tell.

The best proof that sufficient food is being ingested, digested, and assimilated is that one

1. Feels happy,
2. Sleeps well,
3. Eats with an appetite,
4. Is capable of doing an average amount of work,

5. And is, and keeps, at an average weight (preferably a little above it).

Of course, in arranging food estimates, sight must not be lost of the fact that it is principally to keep up the heat of the body to sustain the energies, that the bulk of our food is required: and, hence, people who are idle, and do not take exercise to oxidise and consume their tissues rapidly; and who in addition are well clad and housed, and in other respects protected from the cooling effects of the atmosphere, are capable of living, upon perhaps one half the amount of food required by others less fortunately placed.

AVERAGE WEIGHTS AND HEIGHTS

Males			Females		
Age last birthday	Height ft. in.	Weight st. lb.	Age last birthday	Height ft. in.	Weight st. lb.
1	2 5½	1 4½	1	2 3½	1 4
2	2 8½	2 4½	2	2 7	1 11¼
3	2 11	2 6	3	2 10	2 3½
4	3 1	2 9	4	3 0	2 8
5	3 4	2 12	5	3 3	2 11
6	3 7	3 2½	6	3 6	2 13¾
7	3 10	3 7¾	7	3 8	3 5½
8	3 11	3 13	8	3 10½	3 10
9	4 1¾	4 4½	9	4 0¾	3 13½
10	4 3¾	4 11½	10	4 3	4 6
11	4 5½	5 2	11	4 5	4 12
12	4 7	5 6¾	12	4 7½	5 6½
13	4 9	5 12½	13	4 9¾	6 3
14	4 11¼	6 8	14	4 11¾	6 12¾
15	5 2¼	7 4¾	15	5 1	7 8¼
16	5 4¼	8 7	16	5 1¾	8 1
17	5 6¼	9 5	17	5 2½	8 3½
18	5 7	9 11½	18	5 2½	8 9
19	5 7¼	9 13½	19	5 2¾	8 12
20	5 7½	10 3¼	20	5 3	8 11½
21	5 7½	10 5	21	5 3	8 10
22	5 7½	10 7	22	5 3	8 11½
23	5 7½	10 7½	23	5 3	8 12
24	5 7¾	10 8	24	5 2¾	8 9
25-30	5 7¾	10 12¼	25-30	5 2	8 8
31-35	5 8	11 6	31-35	5 1	8 9

AVERAGE WEIGHT OF A MALE INFANT

	Lbs.	Oz.
At Birth	6.	8
1st month	7.	4
3rd ,, ...	9.	6
6th ,, ...	12.	4
9th ,, ...	15.	8
1 Year	18.	8

CHAPTER VI.

The Diet of Infancy, Childhood, and Adult Life.

The influence of age, sex, stature, occupation, and climate, on diet may now be considered with advantage.

Infancy.

The subject of infant food has agitated the minds of the world since the dawn of history, and yet, perhaps, more ignorance generally prevails respecting it, than of any other matter connected with the wellbeing of humanity. Scarcely two people are in agreement except upon the one principle, which is, that the sustenance intended by nature on which to rear babies is mother's milk, and even about this, few people hold precisely similar views. There are some over-zealous mothers, who persist in their efforts to outdo "Mother Nature,"

and foolishly imagine they can improve upon her methods to expedite human growth and development by supplementing her gift with cow's, asses', goat's, condensed or desiccated milk, starches, sugars, fats, sheep's brains, drugs, and hosts of other miscellaneous products too numerous to catalogue; and long before the new-born infant possesses the vitality to survive such treatment, it is fed on every variety of solid food. Other mothers wanting in zeal, gladly persuade themselves of their incapacity to discharge the *duty* designed for them in the roll of creation, and are willingly convinced that cow's milk can be humanised. The sooner, indeed, it becomes generally known, that to humanise the milk of a cow is as impossible as to humanise the cow herself, the more frequent will it be for mothers to feed their babies with their own milk, and the happier will be the prospect for this, and future generations. For of every 1000 children born in England and Wales each year, 150 die before they are twelve months old, and worse still, most of these innocents die of diseases caused by improper feeding. Indeed, the annual death toll from

diarrhœa, *convulsions*, and other *infantile* ailments has not much improved in the last 50 years, and is not likely to improve in the next, unless greater attention and care is given to the solution of the apparently simple problem of "How shall I feed baby?"

"The child is father of the man," and, therefore, it should not be forgotten that the whole after-life and history of an infant is influenced by all conditions which affect it, even from the very period of its conception.

When a mother is unable or unwilling to nurse her offspring, it necessarily follows that a foster-mother or "wet nurse" should be secured; and theoretically there can be no exception taken to the soundness of this conclusion. Practically, however, it must be admitted, the possibility of adopting this course is not often feasible, as the cost is great, the difficulty to surmount considerable, and the result often disappointing. Therefore, in the great majority of instances, there is no option but to have recourse after all to milk which is not of human origin; and the consensus of intelligent, educated, and scientific opinion is, that cow's milk had then best

be depended on for affording the required nutriment.

Cow's Milk.

Leaving the indefinable *human element* of mother's milk out of the question, cow's milk possesses all the essential proximate principles of food necessary for infant growth and development, and as compared with the milk of any other domesticated animal, is the best substitute for human milk.

The following table represents the composition per hundred parts of different milks.

	Woman	Cow	Ass	Goat
Casein, flesh-forming Proteid, etc.	2·7	4·2	1·7	5·5
Cream, Heat-giving Hydrocarbon	3·5	3·8	1·3	5·6
Sugar, Fat-making Carbohydrate	5·	3·8	4·5	3·6
Bone-formers, etc., Salts	2·	7·	5·	6·

From the above, it will be seen at a glance, that there is present in cow's milk very much more *casein* and *salts*, and less *sugar*, than in human milk.

In addition to these differences, it is known: First, that the casein of cow's milk forms

a larger, firmer, and more indigestible *curd* than the casein of human milk.

Secondly, that cow's milk, by the time it is delivered, has often become *acid*, whereas mother's milk is alkaline.

Thirdly, that cow's milk often teems with *microbes*, whereas mother's milk is free from them.

In some measure to remedy these defects and to adapt cow's milk to better suit new-born infants, it is necessary to reduce the percentage of casein and salts and increase the percentage of sugar. But to accurately accomplish this, necessitates a knowledge of chemistry and the possession of a laboratory; and though there are some reputable firms who supply milk thus prepared its cost is a bar to its universal use. Happily, however, it is well within the power of any mother by a little attention to modify ordinary cow's milk, for all practical purposes, to suit her baby.

To reduce the proporation of casein to one half, an equal quantity of water should be added to cow's milk; but, as this further reduces the proportion of its sugar and cream, 2 teaspoonfuls

of milk sugar and a tablespoonful of cream ought to be added to each pint of the mixture to bring it to the required standard.

The substitution of barley water for ordinary water, to mechanically prevent the formation of tough curds, and the addition of lime water to counteract any acidity is often also most useful.

The question as to whether milk should be *boiled* or not is one upon which considerable disagreement prevails. As mother's milk is not boiled, it follows if one could be certain of the purity of cow's milk, that also should not be boiled. Apart from its diminishing the actual nutritive value of milk, which it does, boiling certainly also alters the taste and *destroys* the "living principle" of milk: and babies fed for many months entirely upon boiled milk become pallid, do not as a rule thrive well, and are particularly liable to suffer from *rickets*, *convulsions* and *bronchitis*. On the other hand, the risk of conveying disease to an infant, by feeding it on uncooked cow's milk is not inconsiderable. Therefore, if it be decided to boil the milk, a little raw beef juice should occasionally be added to it, to obviate the ill

effects to which it is liable to give rise from the absence of "living principle" and sufficient salts of iron, etc.

"Sterilising" milk (by heating it for a few minutes short of boiling) and "Pasteurising" by heating it to a temperature of between 158° F. and 176° F. for half an hour, are also effectual ways to destroy most of the organisms of disease which milk might contain, and are preferred to boiling by many, as the loss of nutritive material is insignificant, if any, if either plan be adopted.

Goat's and asses' milk if suitably prepared, may, at times, be used instead of cow's milk, but they are expensive, and difficult to obtain. Further, asses' milk, which is poor in casein and in cream, though rich in salts, is only suitable, if unmodified, for very debilitated babies with weak digestions; and goats' milk, which is too rich in casein, cream, and salts, is, if unmodified, too hard to digest for any but the most robust and vigorous infants.

An infant should be fed as exclusively as possible upon milk until its sixth or seventh month of life, for until the period of "teething" it cannot digest starchy foods.

Time.

A baby should be regularly fed for the first six weeks of life about every two hours during the day and about every four hours during the night; after which time the intervals may be increased to three or four hours during the day and six or eight hours during the night.

Quantity.

The quantity of milk an infant requires is less than often supposed, and the children of the "well-off" more often die, of over-feeding than under-feeding.

As at birth the *stomach* is only *large enough* to contain, without distension, *two tablespoonfuls* of fluid, this quantity of milk should not be exceeded, for each feed, for the first three days of life. Subsequent to the third day, and until the end of a fortnight, three tablespoonfuls will suffice; from the fourteenth day to the end of the month, four; and from the first month to the third, six, gradually increased to eight, are enough. After the fourth month undiluted cow's milk may usually be given with advantage to healthy children, and a couple of pints of

it ought to be consumed per day when the age of six months has been attained.

Absolute cleanliness is essential in the preparation of the milk and bottle for hand-fed children.

The bottle should be one which can be easily and thoroughly washed out, and be fitted with a nipple only.

The same régime will not of course suit all babies, and modifications of the above system of feeding may occasionally be required.

The following are the indications of defective feeding and nutrition.

If a child sicks up curds, it is either getting too much milk, or getting it too quickly, or getting it in too indigestible a form.

If a child passes curds and suffers from diarrhœa or constipation, the milk is too strong.

If a child digests its food, but wastes and is always hungry, it is having its milk either too poor or too diluted.

If a child gains in weight too slowly, too little sugar may be the cause.

If a child suffers from acidity, diarrhœa and green motions, too much sugar may be the cause.

Further, too little cream causes hard stools, and too much cream gives rise to vomiting, diarrhœa, and fatty soft motions.

If a baby takes its food well, sleeps well, gains weight, and is happy, leave well alone, for too much caution cannot be exercised in altering its diet.

It should not be forgotten that babies often cry because of thirst as well as of hunger, and a tablespoonful or so of warm water is the proper corrective for this, and can never do any harm.

Weaning.

The best time to wean a healthy infant is at the tenth or eleventh month, but it should not be done suddenly. And it may be well, if the baby is not progressing, from the seventh month to supplement the milk given, by the addition each day of a little feed of arrowroot, prepared barley, isinglass, sago, rusks, tops and bottoms, boiled bread, bread and milk, beef tea, or other such like preparations which are easy to digest and suitable to form a pap with milk.

Diet of Childhood.

From the age of twelve months upwards, as the teeth are cut and the child grows, the diet

requires to be gradually increased, and nourishing broths, lightly boiled eggs, bread and milk, oatmeal porridge, light puddings, well cooked vegetables, white fish, fresh meat, and ripe fruit may be gradually added to it with great advantage; for though milk and farinaceous foods should form the staple food of children until they have attained the age of about seven years, it is a mistake to restrict them too closely to such foods, for, there can be no doubt but that the best development of the body and mind is compatible only with *a good mixed and varied diet*, and it is well known, too, that Children and Infants *deprived of fresh animal and vegetable juices*, and fed all but exclusively on starches and boiled milk, become ill-nourished and frequently are the victims of *diarrhœa*, *bronchitis*, *convulsions* and *rickets*, or suffer from *scurvy*, *skin affection*, and other disorders.

Relative Amount of Food Required.

The quantity of food required both by Infants and Children is quite out of proportion to their weight, and this is due to the fact that during infancy and childhood growth proceeds at a far greater pace than during any other time of life,

and to maintain the equilibrium of the body provision has to be made *not only for replacing the structures which waste, but also for the constructive processes which are maintained in health.*

Infants and children, too, more rapidly lose heat than adults, in consequence of their presenting, in proportion to their weight and size, a much larger skin surface to the cooling influence of the atmosphere, and hence they require and thrive best on a diet composed of plenty of *fats and starches* (to warm them), mixed with a due proportion of *animal proteids* (flesh-formers) to build up their muscles and organic structures (*see* appendix or diet charts).

The following is the approximate amount of food required by a child compared with a man.

Under 2 years				$\frac{3}{10}$ths.
From 3	„	to	5	$\frac{4}{10}$ „
„ 6	„	to	9	$\frac{5}{10}$ „

Children at the age of ten years require half and at the age of fourteen years an equivalent amount of nourishment to a woman. Young men who have not attained full growth require more food than adult men.

Adults require a sufficient mixed diet, which

ought to vary day by day, as sameness of food takes away the appetite and impairs the digestion.

As age advances and growth stops, less food is needed, and when the senile period of life is reached, the amount and nature of food required approximates more closely to that of childhood.

Sex.

A woman requires one third less food than a man, and female children perhaps a little less food than male children.

Stature.

Height and *Weight* are important factors also in determining the amount of food required. For instance, tall thin men, as compared with short stout ones, are at the disadvantage of not only having a larger surface of skin exposed to the cooling influence of the atmosphere, but also in being deficient in fat to keep the heat of their bodies from radiating. Hence, tall and thin people usually require more food than short or stout ones, and tall broad fat men than compact small fat men of equal weight.

Occupation.

Hard manual labourers require twice as much food as idlers, and brain workers require nearly as much food as labourers, though of a lighter and more digestible nature.

Climate.

In hot weather easily burnt up fatty food is to be avoided, and less flesh meat should be ingested, for, as most of the water from the system is discharged as perspiration by the skin, the kidneys are less active and cannot flush out perfectly the waste derived from animal proteids and juices; and therefore fruits, vegetables, cereals, and milk, constitute the most suitable articles of diet for warm climates and in hot weather.

More fluid in the form of beverages is needed in hot weather, to maintain the great loss of water by perspiration (which equalises the temperature of the body) and, at the same time, to enable the kidneys to clear the system of waste.

It is wrong, however, to drink to excess, as this, by unduly increasing the action of the skin, adds but to the discomforts of the heat.

Non-stimulating beverages, made of fresh lemons, or fruit juices and water, are best; and weak tea, which is a stimulant, to antagonise the enervating and exhausting effects of heat, is very useful. Sweet drinks and ices tend to aggravate thirst, and their cooling influence is but very temporary.

To quench thirst a glass of water, flavoured if desired, gradually sipped is more efficacious than three times the quantity of iced fluid gulped down; and, contrary to what might generally be supposed, water, at the temperature of the air, is more useful for this purpose than that cooled by ice to nearly freezing point. Further, the sudden chilling of the interior of the body with copious draughts of iced fluids, or even cold water, has frequently been the cause of *appendicitis* and other serious consequences.

In cold weather a greater abundance of every kind of food is essential, and fatty, oily, and greasy heat-giving substances are particularly suitable; as a proof of which, the inhabitants of the Arctic zones relish most the fattest blubber, and it is recorded on the best

authority that they partake of tallow candles with relish.

Number of Meals.

Three meals a day are ample. A good breakfast, a not too heavy mid-day meal, and a substantial repast when the labour of the day is over is best adapted to the requirements of most people.

An interval of about five hours between meals (to ensure the thorough digestion of the food taken) and of two hours between a meal and retiring to bed should be observed.

The correct nature of each meal in respect of its weight, and the proportion of flesh and starchy food it should contain, has been estimated thus :—

Cooked food required per day by an adult = 3 lbs. or 48 ozs., of which 2 lbs. (32 ozs.) should be of vegetable and 16 ozs. of animal origin.

Menu in Ounces.

	Breakfast		Dinner		Supper	
Animal food	$5\frac{1}{3}$	+	$10\frac{2}{3}$	+	0	= 16 ozs.
Vegetable food	$9\frac{1}{7}$	+	$13\frac{5}{7}$	+	$9\frac{1}{7}$	= 32 "
	$14\frac{10}{21}$	+	$23\frac{29}{21}$	+	$9\frac{1}{7}$	= 48 "

This régime will not, however, be found

to suit all people, for many individuals cannot and ought not to work very hard after a heavy mid-day meal.

Exercise and Food.

To favour digestion, active muscular or mental exercises should be avoided after eating; a leisurely walk is, however, beneficial.

It is useful to remember:—The blood circulates most freely in that organ which is most active, and therefore to unduly divert blood from the stomach to the brain or muscles after eating must always be harmful, and tend to arrest the digestion of food.

Dietetic Rules.

1. A wholesome diet of meat, fish, vegetables, and fruit is best.
2. Sameness of food cloys, and variety day by day is most wholesome.
3. Meat, fish, and poultry should be thoroughly cleaned and well cooked.
4. Vegetables should be steeped in salt and water, and well cleansed by running water before use.

5. Milk ought to be "sterilised" or boiled.
6. Three meals a day at regular intervals are necessary.
7. Sound teeth are essential to perfect digestion, for they triturate the food, and break up the starch granules of vegetables, and expose them to the digestive power of the saliva.
8. Slow mastication, and the absence of hurry, flurry and disturbing thoughts, contribute to good digestion.
9. Ingesting draughts of fluid with meals dilutes the digestive juices, and retards digestion, and therefore ought not to be indulged in. A small quantity of fluid may, however, be imbibed in sips to aid mastication if necessary.
10. After a meal, mental concentration and active physical exercise are hurtful, and should be avoided.
11. Cold food is less digestible and nourishing than warm food, but being less stimulating and heating is suitable for summer weather.
12. Boiled flesh is more digestible than roasted, but roasted is the more nourishing of the two.

13. Congenial companionship and pleasant associations promote the appetite, and the digestion and assimilation of food.

14. Cease eating previous to feeling satiated, for overloading the stomach interferes with its functional activity, and is a frequent cause of indigestion.

CHAPTER VII.

The Examination of Food.

The marked and characteristic features of good and bad food should be understood, so grave is the risk to health from eating unsuitable articles.

Butcher's Meat.

The flesh (muscle) should be dry, firm and elastic, of a deep red colour (except pork, veal and lamb), and marked with streaks of firm white fat. If pale and moist the animal was either young or diseased, or if purple may not have been slaughtered, but have died of disease.

Good meat is nicely streaked with fat and dries on the surface on standing for a day or so, and any juice which exudes is small in quantity and reddish only in tint (this usually occurs excessively with meat which has been frozen).

There should be an entire absence of unpleasant smell. Meat commencing to decompose has a sickly odour, is pale in colour and is alkaline in reaction—that is, it turns blue a piece of red litmus paper (which can be obtained of any chemist).

If meat be undergoing decomposition, a small quantity of it finely chopped up and well mixed with warm water will develop a characteristic odour, and a clean skewer pierced through it will also smell offensively.

Pouring hot water on *bad sausages* will also bring out the odour of decomposition.

If the flesh of cattle or pig contains small round white bodies of $\frac{1}{25}$ to $\frac{1}{4}$ inch in diameter, they may be the eggs which develop tapeworms in human beings. Very minute whitish specks in pig's flesh may indicate the presence of the trichina parasite which so often causes the terrible disease of *Trichinosis* on the Continent.

Bone marrow when sound is rosy red in colour, and is not punctated with discoloured spots.

Brine of salted meat should not be sour or offensive.

Poultry should be firm and well fed. The skin ought to be elastic, and of good colour; not soft, sodden, greenish and of an easily broken nature, and there should be an entire absence of any unpleasant odour.

Game is generally considered best when "high." To thus eat decomposing flesh requires a similar "taste" to that acquired by the Chinese, who much esteem "high eggs." It cannot certainly contribute to health when thus ingested.

Fish should be free from smell, firm to touch, and devoid of suspicious odour. The eyes ought to be clear and bright, and the gills fresh and red in colour.

Fruits and vegetables should be ripe and firm, of good colour and free from mould, decay, or unpleasant odour.

Flour.

Good flour is all but white and free from smell or mustiness. It is soft and powdery to the touch, and if of the best quality, will all but cohere when pressed together with the fingers. It also forms a stringy dough when mixed with water.

Oatmeal ought to be free from husks, and agreeable to smell and taste.

Bread.

Good bread is white in colour, agreeable to taste and smell, and possesses a firm white crumb permeated by small cavities.

Bread made of either bad yeast or flour, or rice, is usually heavy, sodden, and sour.

Milk.

Good milk is rich and white in colour; and, if allowed to stand in a narrow tall glass vessel for eight hours, should be free from deposit, but cream equivalent to $\frac{1}{10}$ of its depth should rise to its surface.

The specific gravity of fair milk (tested with a lactometer) is 1030; and, every 3 points less than this, usually indicates that the sample has been adulterated by ten per cent. of water. The addition of water also of course lessens the proportion of cream in milk.

The milk of cows for some days after calving is of high specific gravity and yellowish in colour, and ought not to be used, for it possesses indigestible, irritative, and purgative properties.

Butter.

Pure butter should be pleasant to taste, practically free from colour, and of a fairly firm consistence, and if melted in a long glass test tube, four-fifths of its depth should float on the water, and salts and curds deposited at the bottom of the vessel.

Butter is often adulterated with animal fat, and this makes it more difficult to melt.

The addition of milk to butter makes it softer and possibly more creamy or smoother to the taste, but it is false economy to buy such a mixture, even at an apparently cheap price, as it is deficient in nutritive value, wasteful and much more expensive in the end.

It stands to reason, to add to two lbs. of butter, worth 1/4 per lb., a pint of milk worth 2d—which many factors do—doesn't make the mixture worth 1/- a pound, as the following calculation shows—

2 lbs. of butter at 1/4	£0 2 8
1¼ lbs. of milk (1 pint) at 2d	0 0 2
Thus 3¼ lbs. are worth	£0 2 10
Therefore one lb. is worth	£0 0 10½

Cheese.

Cheese is manufactured by separating the casein or flesh-forming element of milk by the addition of rennet which coagulates it.

When ripe for use cheese should be rich, creamy, and pleasant to eat. Cheese made from milk from which all the cream has been separated is hard, tough, leathery, and indigestible.

Eggs.

New-laid eggs of good size should weigh about eight to the lb. and when held up to the light are more transparent at their centres than at their ends. They should also sink in a vessel containing one pint of water to which two ounces of salt has been added.

Tea.

Good tea possesses a fragrant aroma, and when shaken up with cold water, and strained through muslin, deposits tea leaves only, unmixed with an undue amount of dust, sifting or adulteration of any sort.

Tea leaves are liver-coloured, small and elongated, and have a serrated edge.

Tea is a justly popular beverage, for it

possesses stimulating, refreshing, and restorative qualities, and promotes the action of the skin and kidneys if properly imbibed, by people with whom it agrees. It owes these virtues to the presence of the alkaloid *thein*. It also contains, however, *tannic* acid, which is soon dissolved out of its leaf by boiling water, and for this reason tea, when made, ought not to be allowed to stand more than 3 minutes. Tannic acid is the frequent cause of the indigestion of excessive tea drinkers, as it interferes with the action of the digestive juices. China tea contains less tannic acid than the Indian or Ceylon varieties, and is therefore a more suitable beverage for dyspeptic individuals.

If tea, however, be properly made, with water just boiling, in a heated pot, and allowed to draw for 3 minutes only, an excess of tannic acid will not likely be imbibed; and if thus brewed it be taken in moderation no harm is likely to result from its use, for a cup of it will not contain more than 2 grs. of tannic acid and 1 grain of thein. A pinch of bi-carbonate of soda is sometimes useful to neutralise the acidity of teas rich in acid.

Neurotic or nervous people very often cannot take tea on account of the action of the thein on them, and children for the same reason ought not to be given any.

Coffee.

Coffee is similar to tea in its action, for it also possesses an alkaloid *caffein*, which is all but identical to thein. Coffee, however, acts more on the intestines than on the skin and kidneys.

Notwithstanding that, as compared with tea, coffee contains but one-fourth of alkaloid, and one-seventh of the tannic acid, it is not such a generally esteemed beverage in this country. This no doubt is because coffee contains a greater amount of vegetable fat than tea, and therefore upsets "bilious people," and because few people know how to make it properly.

The principal adulteration used to fabricate coffee is chicory. But if a portion of the mixture suspected to contain it, be thrown into water, the chicory, if present, will sink to the bottom, and the coffee will float on the surface. Caking in the packet also indicates the presence of chicory.

Cocoa.

Cocoa is a favourite beverage with many, and a decoction made with the "nibs" (roasted seeds) is agreeable, stimulating, and refreshing, and free from rich fat. A mixture of the "nibs" crushed and manufactured with sugar, starches, and flavouring agents is sold as chocolate, etc.

Cocoa contains a similar alkaloid to tea and coffee called *theobromine*, but, on account of the presence in many of the mixtures sold, of too great an amount of vegetable fat and sugar it often disagrees with adults and bilious people. It is however a most useful beverage, and is certainly the best and most useful one I know for children, for they can digest it well, if it be pure and of good quality.

Cocoa, as compared with tea, is all but free from tannic acid, and as compared with coffee it contains twice as much alkaloid, and more fat. A genuine preparation of cocoa from which the fat has been separated, and to which an undue amount of starch and sugar has not been added, is undoubtedly the best beverage for those for whom tea and coffee is unsuitable.

Alcohol.

Alcohol cannot be classed as a food or beverage proper, for it neither sustains animal heat, nor does it build up the tissues of the body.

Subsequent to the initial nervous excitement and rush of blood which alcohol causes, the heat of the body is reduced (for the suffused skin parts with its heat very rapidly) and the mental faculties and functions of the body become depressed.

These facts are well known to arctic explorers, who deny it to their crews, for fear of their becoming frost-bitten and incapacitated. It has also been proved that men can accomplish more work on a non-alcoholic diet. Further, the regular ingestion of food is necessary to existence, and once the appetite is satisfied, all craving for food ceases, but the reverse is the case with alcohol; the more people have, the more they usually crave for.

CHAPTER VIII.

Cooking.

The effect of cooking is to make food more appetising and digestible. It develops flavour, breaks open the starch granules of vegetable food, and renders animal food tender, soft and gelatinous. Cooking also destroys the germs of disease.

Meat.

Roasting and Broiling are the most nourishing methods of cooking fresh meat. The heat employed should, however, be sufficient to quickly coagulate the albumin or proteid coating on its surface to retain the juices, and then be lessened, in order to cook it slowly, and not dry it up and diminish its nutritive qualities.

Boiled meat is more digestible, but 25% less nourishing than roasted meat. In boiling, to

retain the nourishment, substances should be plunged at once into boiling water, to coagulate the albuminious surface and then the cooking should proceed more slowly. The liquor should be used for soup, as it contains much nourishment (the 25%) and if properly prepared is stimulating and appetising.

Tough, sinewy meat is more tender when boiled than roasted, for the gelatin contained in the tissues is dissolved and softened by the heat which boiling sends right through it.

Baking.—Meat, cooked in an oven (unless it be kept scrupulously clean, and well ventilated) often develops unpleasant flavours, in consequence of burnt volatile particles becoming deposited on its surface. A double dripping pan (into the lower one of which water should be placed, to prevent the fat and dripping burning) will do much to obviate this.

Stewing requires a heat much below that of boiling water, to extract juices, and less liquid is necessary than in boiling. It is the cheapest and most economical method of cooking, as nothing is wasted; little fuel is required, and the toughest meats are rendered eatable by the

long continued heat and moisture to which they are subjected. As stewing, however, completely separates all the juices contained in meat, if the heat be excessive, they spoil. Stewed food is usually too rich and fatty for all except those possessed of a sound digestion.

Frying is only a suitable process of cooking to adapt for tender meat, which can be cooked rapidly. When frying in oil or fat, the bubbling should cease before putting in the substance to be cooked, for the heat of the fluid will then be above that of boiling water, and will coagulate its surface with a firm coating, which will retain its nourishment. Cooks test this by dropping a piece of bread into the pan, the heat of the oil or fat in which should crisp it in half a minute if the temperature is high enough for frying.

Recooked Food undergoes chemical change, and is apt to disagree with many people; it is less digestible than freshly prepared food.

Cold Food is not as nourishing as hot food, but in summer it is more appetising and less heating. In winter cold food of course cannot

carry any heat (other than the body itself generates out of it) to the body and is hence of less food value.

Vegetables.

In cooking vegetables or fruits the same remarks in respect of heat generally apply.

To retain their nourishment and juices, considerable heat at first is necessary, and to extract them the reverse procedure should be adopted.

CHAPTER IX.

THE EFFECTS OF UNWHOLESOME AND UNSUITABLE FOOD UPON HEALTH.

Preserved Foods.

It has already been stated that an excess or deficiency of food, or the essential constituents thereof of food, may be productive of disease or a general depraved condition of health, and a predisposition to disease. In connection with these influences of food upon health, it must also be added that preserved foods of every kind are much inferior in nutritive value to the fresh products of nature, and are but poor substitutes for them.

Meat Extracts and Essences are practically devoid of any nutritive properties whatsoever, and the most that can be said of them is that they are stimulants, and by their stimulating

action may at times assist nature in bridging a crisis when other forms of nutriment cannot be ingested, or, in digesting substances which are of real nutritive value. An ounce of some of the best known and mostly advertised essences contain only a few grains of nitrogen, and, however much of them one ingested they could not support life. As a matter of fact, dogs have been found to live longer on a diet of pure water than on the most nourishing beef teas and meat extracts. Personally I have known hosts of poor people to beggar themselves by purchasing costly meat juices, when one tenth of the outlay expended on simple food and fresh milk would have been of infinitely greater service, and for this reason I desire to attract special attention to *this* subject.

MILK CONDENSED OR DESICCATED AND PREPARED STARCHY FOODS, upon which many unfortunate infants are entirely brought up, are productive of two thirds of the illness due to lack of nutrition, which crowds our hospitals for children. Most of the "beautiful" examples of such feeding, who take prizes at baby shows, are

simply loaded with unhealthy fat; are devoid of blood, bone, and muscle; but too often are lacking in stamina to survive trivial ailments, and are the victims of RICKETS, DIARRHŒA, BRONCHITIS and CONVULSIONS. It is only, however, fair to mention that there are some brands of condensed milk which are suitable for infants when cow's milk disagrees with them and other methods fail; *but, even then, fresh meat or fruit juice ought to be included in their diet.* After the age of six months, too, many starchy preparations afford a most suitable addition to their menu.

Tinned Foods.

In the absence of fresh meat, vegetables, and fruit, tinned foods have often to be depended upon, but this is the only justification for their general use. Meat and fish thus preserved may contain poison due either to disease or decomposition, and all tinned articles are liable to impregnation by metallic poisons being dissolved out of tins in which they are packed, or from the solder with which they are sealed up.

In addition to which, poisons are often intentionally added as preservatives and colouring

agents, by unprincipled manufacturers. For instance, sulphate of copper is frequently added to preserve vegetables and to make them look green, fresh, and inviting. This adulteration may, however, be detected, by allowing a clean steel knife to stand in the suspected liquor for a short time, when copper, if present, will be deposited on the blade.

Poisoned Fresh Foods, etc.

The flesh of animals dead of disease, or poisoned with food or medicine, may cause disease in a human being. It is only, however, by studying the characteristics of healthy flesh, by dealing with reputable tradesmen, and by thoroughly cleansing and cooking food that danger can be lessened and that such diseases as consumption, intestinal worms, and many other ailments may be absolutely assured against and be stopped from spreading in this way.

Putrid Food.

Every kind of putrefying animal food is liable to cause illness or *ptomaine* poisoning, and the blood of animals made into puddings

is particularly dangerous to consume for the same reason.

Sausages are very unsafe to eat because meat which may not be fresh, or good enough to dispose of openly, can be disguised by flavouring; and further, the intestinal skins which wrap up these "mysterious" products are often tainted with the germs of disease.

Symptoms.

Though food poisoning often attacks immediately on its ingestion with all the signs and symptons of a disturbed stomach, these indications may be delayed for a couple of days. Sickness, vomiting, diarrhœa, cramps, feverishness, and thirst may mark the onset of such an illness, which, if not checked, may cause speedy collapse and death. The skin, too, is often covered by a rash similar to that of scarlet fever, or that caused by stinging nettles.

Fish.

Shellfish (such as lobsters, crabs, and mussels), often, in warm weather, upsets the stomach and intestines, and causes swelling of the tongue, throat, and eyelids, a widely diffused

skin eruption, and similar symptons to those described above.

Oysters are often impregnated with the microbes of typhoid fever, and when taken from beds near sewage outfalls, have been known to cause widespread epidemics of that disease.

Mussels may also be diseased, or similarly contaminated to oysters, or cause metallic poisoning by people ingesting the copper absorbed by them from the piers to which they cling.

Salmon, eels, herrings, mackerel and the liver of halibut, *and all fish out of season*, and too large, fat and overgrown, is liable also to cause illness.

Vegetables.

Decomposing and mouldy vegetables, and unripe fruits, set up disturbances of the stomach and intestines, characterised by sickness, vomiting, diarrhœa, etc.

Water cress, salads and all vegetables, eaten uncooked, should be allowed to stand in salt water and be thoroughly washed in running water before use; for the microbes of *typhoid fever, diphtheria, diarrhœa* and other zymotic diseases, and the eggs of *thread* and other

intestinal worms and parasites, can be contracted by ingesting unclean vegetable food.

Milk.

Milk is perhaps the most general food medium by which disease is transmitted. The germs of diseases to which cows are liable, or poisons which they have taken either as food or medicine, can contaminate their milk, and poison those who ingest it. The milk of cows suffering from foot-and-mouth disease, anthrax and *consumption;* and of cows which have eaten the leaves of the poison oak, or meadow saffron, or have been fed on brewer's grains, sometimes convey disease to human beings. It is also believed by many that cases of *scarlet fever* and *diphtheria* frequently owe their origin to the drinking of milk of cows affected by modified forms of these diseases.

Milk may also become contaminated by the hands of the milkers, the hair and dirt of cows, or the germs of such diseases as glanders, or influenza, affecting horses or other animals stabled in close proximity to cows.

Milk, too, easily absorbs and becomes contaminated by foul air, putrefactive gases, and dirt of every sort.

It is also at times poisoned by the metallic vessels in which it is contained; zinc, copper, and lead vessels, being the most dangerous, in this respect, and enamelled iron the least dangerous.

The spread of epidemics by milk usually results from the microbes of human infective diseases gaining entrance to it from the air, or by means of the water used to adulterate it, or to wash the utensils which contain it. For milk being a typical food, affords a most perfect diet for microbes to live, develop, and multiply upon, and for this reason it soon teems with millions of microbes, once a few have gained access to it, and disseminates infective diseases.

Tainted milk soon also becomes contaminated by the fermentation *fungi* ever present in the air, and hence causes *thrush* and *infantile diarrhœa* very frequently.

It may indeed, unfortunately, be assumed, with every probability of certainty, that all water borne, air borne, and food borne, infective and other diseases, may, without exception, under suitable conditions, be carried and spread by impure milk.

The foregoing are serious imputations to

make against such a widespread, highly prized and justly valuable and indispensible article of diet, but, as hundreds of epidemics of disease have been traced to milk supplies, it is well to be cognisant of the danger of ingesting contaminated milk so that precautions can be taken to obviate the occurrence of those diseases to which milk is known at times to give rise.

Of all diseases, *infantile diarrhœa* is the one which kills the greatest number of children, and that it is principally due to contaminated milk is unquestionable, so were it for no other reason, the subject of our milk supply should merit the closest attention.

The chief characteristics of a milk epidemic are :—

1. Sudden outbreak.

2. Many people occupying different houses simultaneously attacked.

3. Two or more people attacked at the same time in a house.

4. Children and those who drink most milk being more numerously affected than those who drink least.

5. All attacked partaking of the same milk supply.

Preventive Measures.

To ensure an uncontaminated milk supply is not an easy matter, but to antagonise the dangers of such is not difficult. The source of one's supply is of course beyond control, and all that can be done upon that point is to satisfy oneself that milk is being purchased of a reputable vendor, who possesses a dairy fitted in accordance with the latest modern sanitary requirements. Happily also if milk be contaminated, practically all the microbes of infective diseases can be killed by boiling it.

Boiling milk, however, removes some of its flesh and fat-forming elements (which rise as "scum") and makes it less palatable and digestible. To obviate these disadvantages, milk may be satisfactorily "sterilised" by putting it into a stout glass bottle which is then placed for twenty minutes in a pot of water kept boiling. Whilst exposed to the heat of the water, the neck of the bottle should be loosely plugged with cotton wool, and when its contents is "sterilised," stoppered tightly with a sound clean cork. By this method, as the milk is never heated to boiling point, it does not taste cooked. If it be desired, however, to keep milk for more

than a day, it should be either "sterilised" for a longer period, or the process should be repeated at intervals. The milk may also with advantage be strained before boiling or "sterilising" it, through several layers of clean gauze (to separate hairs, dirt, and other particles), and when "sterilised" stored in a clean cool larder. Thus prepared, milk may be consumed with all but perfect safety.

Cheese, Butter, and Cream.

Cheese, butter, or cream, which has undergone fermentation, may give rise to *tyrotoxicon* poisoning. This is indicated by sickness, vomiting, diarrhœa, colicy pains, exhaustion, and general symptoms of food poisoning.

Beyond, perhaps, tasting acid or sour, articles containing tyrotoxicon are not necessarily altered in appearance or flavour.

Food-Poisoning Epidemics.

In connection with food-poisoning epidemics the same characteristics as in milk epidemics are common if the term "food" be substituted for "milk," "all" for "children," and "eat" for "drink."

CHAPTER X.

Food in Disease.

Though medicine may be essential in the treatment of disease, it does not take the place of food, for it cannot supply nutritive material to repair the waste which attends every thought and act of life.

Very few people know how to feed an invalid, because the art of doing so is supposed either to be so simple that its study is unnecessary, or that it is too difficult for anyone but a trained nurse to acquire. As a matter of fact, however, the truth lies between these two extremes, and any person who will exercise a little consideration and common sense need not have any difficulty in mastering the subject. The indications to guide one are similar to those which obtain in health, viz., to contrive that the supply of food shall approximate as closely as possible

to the demand for it, and to the excessive waste which characterises disease.

The difficulties to overcome in accomplishing this are sometimes insurmountable, because though the demand may be supplied, yet the organs of digestion and assimilation often fail to utilise the nutritive materials ingested. Another reason is that though the different organs of the body are beautifully endowed with special functions, they are linked together by the nervous system which co-ordinates their activities and renders them to an extent inter-dependent upon each other, and when the excretory organs fail to discharge waste, the organs of digestion, absorption, and assimilation fail also to execute their reparative functions of supply. In a word:—In disease the equilibrium of the body is upset, and to try and re-establish it is the object to endeavour to attain. As a proof of which, all diseases disturb equilibrium in proportion to their gravity, and according to the importance of the organ attacked; and loss of body weight is usually the most common and early indication of a serious affliction. Not only by reason of the foregoing circumstances is it quite impossible to

lay down any hard and fast rule to follow in the dieting of invalids, but also because invalids differ in their tastes—and certain diseases, to be hereafter mentioned, are benefited only by certain classes of food. For general guidance it is, however, happily, safe to formulate certain principles (to which there are but few, if any, exceptions), which may be always observed, for they are based on the knowledge that the vital activity of the organism is defective in disease, and that the strain to which it must be subjected should be as slight as possible.

The questions which must first arise in every case are—

Shall food be given?
How shall food be given?
What quality of food shall be given?
What quantity of food shall be given?
How often shall food be given?
At what hour shall food be given?

Shall food be given?

In many cases it is well, for perhaps twenty-four hours, not to give any food at all. For instance, in cases of gastric irritation—the result of overfeeding—or when everything given is

rejected, and if retained for a time, causes pain, diarrhœa, colic, or great discomfort, it is a mistake to irritate or further perhaps overload the stomach.

In such cases, an occasional tablespoonful of hot water with a few grains of bi-carbonate of soda, or a small piece of ice placed in the mouth at intervals, will suffice until the more urgent symptoms have subsided.

How shall food be given?

In as fluid a state as possible, and by the mouth if practicable.

The alternatives of feeding by the mouth are imperative in some cases. In refractory patients who refuse to take food, or in cases where obstructive diseases affect the upper passages or throat, a fine rubber tube inserted through the nose or mouth down to the gullet or into the stomach has often to be resorted to for the purpose of conveying nourishment to keep them alive.

Again in conditions of extreme gravity, obstructive, inflammatory, or otherwise, attacking the gullet, stomach, intestines, or other organs, injecting nourishment into the lower

bowel (Rectum) is frequently imperatively required to support life.

The foods given by the foregoing methods need differ in no particular from those suitable for ordinary fluid feeding by the mouth, except that for rectal feeding quantities of the most concentrated and usually predigested fluid foods, not exceeding a wine-glassful, are syringed into the bowel at blood heat about every three hours, or even more frequently if retained. And in feeding through a stomach tube predigestion is also usually indicated.

It is necessary, in rectal feeding also, to wash the bowel out each day with soapy water, so that the nourishment thus given may be easily absorbed into the system.

What quality of food shall be given?

The foods which are the easiest of digestion are the best; and a reference to the table already given, or at the end of the Appendix, will indicate them pretty fully.

If, however, the capacity to digest food is in abeyance, then *Proteids* may be predigested by *Pepsin*, *Starches* by *Diastase*, and *Fats* by *Pancreatin*; the directions how to use these

products will be found on the vials containing them, etc. (*see* appendix.)

Milk.

Of all foods, "sterilised" milk is the best, and is the *sheet anchor* to rely on for invalid feeding. A patient, whose diet scale is based upon 3 or 4 pints of milk a day need not be the cause of very much anxiety in respect to the lack of nourishment. For in the event of milk disagreeing, it may invariably be modified and made digestible :—

First—If it be too *fat*, the cream may be digested by the addition of *pancreatin.*

Secondly—If its *casein* is indigestible and forms large and tough curds, *pepsin* may be added to digest it, or *barley water* to mechanically separate the curd into smaller particles.

Thirdly—If it is *not* sufficiently *nourishing*, it can be enriched by cream, white of eggs, or *whipped* eggs, etc.

Fourthly—If by reason of "sterilisation" and deficient iron salts, it fails to support nutrition, *raw beef juice* may be added to it.

By referring to the section which treats upon the influence of milk upon ill-nourished

babies, it will be understood how the results of the above conditions may be recognised, and how best to alter milk for infant and invalid feeding.

A pint of milk contains nutriment equivalent, approximately, to three-fourths of an ounce of cheese and a little less than this weight of butter, and of sugar, with a teaspoonful of nourishing salts; and, as it contains all the elements of nutrition required for the sustenance of the body (except iron salts) in perfect proportion to each other, every effort should always be made to adapt it to suit an invalid; and should it pall upon the patient, the addition of a little cinnamon, nutmeg, vanilla, or other flavouring may render it more acceptable.

Soda water effectually serves for diluting milk if flatulence be not present; and the addition of lime-water, or a few grains of bi-carbonate of soda often makes it more acceptable to the palate, less acid, and also more digestible.

In very grave cases where even milk cannot be digested or retained, notwithstanding all endeavours to modify it, then, either whey, or the white of an egg mixed with half

a pint of water, or barley water, or beef juice, may serve to sustain the body until more nourishment can be taken, if the animal heat be in the meantime well maintained by hot bottles, and warm coverings.

Broths.

In addition to milk, in ordinary cases, mutton, chicken, and veal broths often serve as useful additions to vary the diet of an invalid, though they possess far less nourishing than stimulating qualities; and very little indeed of either. Broths are, however, not always suitable and are particularly liable to disagree and cause diarrhœa in cases of typhoid fever, and other conditions due to intestinal irritation, and, therefore, sight should not be lost of these facts.

Farinaceous Food.

Next to milk, farinaceous foods are the best on which to rely to sustain invalids, for they are nourishing and easy of digestion, and serve admirably to enrich milk or broths, and rice, sago, tapioca, cornflour, arrowroot. Barley is perhaps the most useful product of the vegetable world with which to feed patients when starchy food is indicated.

Eggs and Jellies.

Whipped eggs (raw) are very nourishing; and jellies and isinglass are often gratefully received by invalids, and benefit them to some little extent, for though they probably do not serve to build up new tissue, they conserve and save, in some measure, the waste of that which is already formed.

When convalescence is established, the diet needs to be more substantial and less fluid in its nature; and additions should cautiously be made to it, until that food which is suitable for a healthy person can be digested, with comfort and benefit.

What quantity of food shall be given?

As much as a patient will retain, digest, and benefit by. But as the amount of same varies considerably for different individuals, and in different diseases, close observation is necessary to ascertain, in any particular instance, the quantity essential to the welfare of the patient.

An invalid is benefited by the amount of food he digests, not by the amount he swallows, and, therefore, the exercise of undue zeal in forcing

nourishment upon him is more dangerous than giving him too little, or at times, even none at all.

Speaking generally, a daily régime of three pints of milk, one pint of broth, a couple of raw eggs, and a little farinaceous food, given in quantities of not more than a small cupful at a time will amply suffice in all ordinary cases, and need scarcely ever be exceeded in any case whilst on a fluid diet.

How often shall food be given?

Frequent feeding with small quantities of nourishment is always the best principle to follow in all cases of illness. About every two hours during the day, and every three hours at night—unless the patient be wakeful and exhausted, when he may be fed quite as often as by day—may be accepted as a good plan to adopt. In grave cases, where very small quantities of fluid nourishment can only be taken at a time, almost constant feeding in tablespoonfuls may be required; and as in such serious instances of disease not more than four ounces (8 tablespoonfuls) of food is likely to be assimilated every two hours, to exceed this

quantity is all but useless; unless, giving more does not disturb and also benefits the patient.

If, of course, food be craved for, and it is not rejected, one's discretion must always be exercised and the quantity advised exceeded when necessary.

At what hour should food be given?

At all hours if the patient is awake and needs nourishment, for except under special circumstances only should the sleep of an invalid be disturbed more frequently than is absolutely necessary.

When patients are convalescent, but before they have recovered their strength sufficiently, nourishment should always be given to them at least an hour *before they rise* in the morning, and when they have *returned to bed* in the afternoon in preference to other times; for when the body is at rest the digestive organs can utilise more of their energy in the discharge of their functions.

In every case of disease the closest attention must be paid to the action of the *bowels*, *kidneys*, *skin* and *lungs*; for these are the organs

which discharge the waste products from the body, and it is principally upon their activity that the amount and the nature of the diet required in any particular case depends.

Suitable Diets for Certain Diseases.

As the foregoing system of invalid dieting requires to be either very rigorously adhered to or carefully modified, in certain conditions of ill-health, I purpose now briefly to indicate some of the diseases which require special mention in this respect.

Fevers.

A fluid milk, and farinaceous diet, with a small quantity of broth, and a little barley water, plain water, toast water, or lemon water (sweetened slightly) to allay thirst, is most suitable until the crisis is passed.

At the outset of a fever, and before its nature is pronounced, solid food of every kind should be absolutely withheld; for in *typhoid fever* solid food often has caused a fatal rupture of the bowels.

Acute Rheumatism.

The diet should be as indicated for fever, and given liberally, but in small quantities, for as the heart is often seriously attacked in this disease care should be taken not to overload the stomach and thus injuriously affect it. Lemon drinks are useful to allay thirst, as lemon juice is believed by many to be useful in neutralising the acidity of the blood.

Gout.

In gout, the kidneys, which discharge most of the nitrogenous waste from the system, are usually at fault, and hence a non-proteid diet is best. A lacto-vegetarian diet composed of milk, farinaceous foods, and green vegetables; and the avoidance of sugar, sweet juices, alcohol, and tea, should be adopted. Whisky, well diluted, is the least objectionable form of alcoholic stimulant to give; and of starchy foods, potatoes are the most likely to disagree.

As conditions improve, white fish, boiled or roast mutton or chicken may be ingested, but condiments and spices should be eschewed as long as possible; and such articles of diet

as veal and pork ought seldom, if ever, be partaken of by gouty subjects.

Rickets.

This disease is generally due to children being fed upon a too exclusive diet of *boiled or condensed milk and starches.* New milk, lime water, fresh fruit juices, and raw beef juice contain the salts necessary for the proper consolidation of growing bones, and may be given liberally with great advantage, both for prevention and cure of rickets (*see* "Infant Feeding.")

Scurvy.

Fresh meat, vegetables, or fruit juices must be included in a diet to obviate the occurrence of scurvy, or to cure it.

Scurvy-rickets has recently become a rather common condition in England, and it is all but confined to babies who are brought up by hand and are improperly fed on boiled milk and starchy food only.

Diabetes.

This disease is characterised by the elimination by the kidneys of immense quantities of water containing much grape sugar, and

often also by great wasting of the body ; for the sugar, into which all ingested starch is converted by the processes of digestion, passes out of the system unaltered, instead of being stored up as *Glycogen* by the liver, and utilised to repair the waste, and add to nutrition and development of the body.

Many cases of diabetes are only benefited when rigorously kept on a non-starchy diet, the loss of the heat-giving qualities of which is compensated by a liberal substitution of fatty and proteid articles. As opinions, however, differ as to the general application of this system, the physician in attendance upon a case is the one to decide whether it be suitable for his patient.

The following is the diet usually considered most suitable for a victim of this unhappy malady.

May be Eaten.

(1) ANIMAL FOOD.

Fresh meats of all kind.
Ham, bacon, and tongue.
Poultry, game, fish.
Soups and essences.
Eggs, cheese, cream.

(2) CEREAL FOOD.

Gluten bread.
Almond bread.
Diabetic non-starchy biscuits.

(3) VEGETABLE FOOD.

Spinach, water cress.
Mustard and cress.
Green lettuce, cucumber, mushrooms.
All green parts of vegetables.

Doubtful.

(But may be given to a not very severe case, if boiled in plenty of water.)

Cauliflower, broccoli, turnips, sprouts.
Asparagus, marrow, and green beans.

The following articles

May Not be Eaten.

Bread and biscuits, and cakes made of ordinary flour.
Rice, arrowroot, sago, tapioca, macaroni, vermicelli.
Potatoes, carrots, parsnips, tomatoes, peas, beans.
Scarlet runners, cabbages, artichokes, endive, beet-roots.
Fruits, sweets, preserves.

Beverages.

Not milk, as it contains sugar. Alcohol is also contraindicated, but either a dry wine, a whisky, or a brandy is the least objectionable

form of an intoxicant to give, if the patient will not be denied.

Natural mineral waters and soda water, and tea and coffee in moderation are harmless. Chocolates (cocoa prepared with sugar and starches) are to be avoided, but a decoction of cocoa nibs (freshly roasted) is stimulating and beneficial.

Anæmia.

Anæmia and other diseases due to an impoverished condition of the blood, and lack of iron in it, are benefited by a liberal supply of milk, underdone flesh meat, tender green vegetables, and ripe fruits, if the organs of digestion and assimilation are not injuriously affected by solids. It is necessary to be mindful of the last observation, for many young women who suffer from Anæmia are also affected by "gastric ulceration," and they, of course, should *avoid solids* until better.

Diseases of the Throat, Nose, Upper Air Passages, and Gullet.

Small quantities, frequently given, of easily digested fluid or semi-fluid foods agree best.

Those who suffer from certain diseases of the throat and *paralytic* conditions often can swallow bread and milk better than milk alone, and this should be borne in mind.

Diseases of the Lungs.

A diet similar to that suitable for fevers is indicated in the acute inflammatory stages of all lung diseases: But when fluid has collected round the lungs (as in pleurisy), limiting the supply of drink is sometimes most useful and curative in its effect.

In CHRONIC AFFECTIONS of the lungs and consumption, all the most digestible and nourishing articles of diet and cod-liver oil should be partaken of; for it is only by the ingestion of *good food*—plenty of milk, eggs and cream, and underdone meats, tender green vegetables, ripe fruits, and nutritious sweets—and an abundance of *fresh air* and *rest* that a cure is to be effected.

Consumption.

The rationale of the correct treatment for CONSUMPTION is to supply, if possible, more than sufficient food or fuel to counteract the

waste which this disease causes, until the normal weight of the body is re-established.

As exercise increases the combustion of the tissues of the body, more exercise should not be taken by a consumptive than is absolutely necessary to improve the functional activity of his body, and hence *rest* is such an important part of the cure.

The best régime is as follows :—

Half an hour before rising. 7.30 a.m., a glass of milk in which a raw egg is whipped, or to which some cream is added.

Breakfast, 9 a.m. Oatmeal porridge or some farinaceous food. Fat bacon and egg or ham, or a chop, steak, or some fish. Sweet fruits in season. Bread and butter, or well-buttered toast. Cocoa, coffee, or tea in moderation.

Between breakfast and dinner, 11.30 a.m. Large glasses of milk with barley or lime-water; or a cup of strong broth with an egg or piece of toast, or a couple of sandwiches of finely-scraped raw beef.

Dinner, 1.30 p.m. Fish, meat, vegetables, farinaceous, milk or egg puddings, sweet fruits and cream, bread and butter.

Afternoon meal, 4 p.m. Same as at 11.30 a.m.

Tea, 6 p.m. Boiled sole or other white fish, lightly boiled new-laid eggs, buttered toast and bread, tea, coffee, or cocoa with plenty of milk or cream, or a little chicken with ham or cold boiled bacon.

9 p.m. A cup of strong broth or, better still, a basin of farinaceous food with milk and cream, with the addition of as much "sterilised milk" as a patient can digest comfortably.

The above dietetic outline is a good one which may be modified at times with advantage to suit the taste of a patient; and if such a full diet disagrees it must of course be diminished.

It is essential that such a liberal diet scale should be gradually and carefully arrived at; and never be given to the extent of upsetting the digestive functions which unfortunately but too often occur and defeat the aim over-zealous nurses desire to attain. To guard against this, strict attention must be paid to the regular action of the bowels by giving an occasional aperient or an after-dinner pill; or a dose of diastase pepsin, or pancreatin (or all three combined) after food, will often be found useful in assisting the stomach to digest the starches,

sugars, proteids, and fats contained in the foods suggested; and a simple bitter stomachic tonic may often be useful to sustain the appetite; but these considerations had always be better referred to the physician.

Poor people, who cannot afford to secure such an expensive diet as that indicated, may do equally well on a less costly one. Probably the cheapest foods from which to obtain the elements necessary for nutrition are as follows:—

Proteids, flesh-formers.—Peas, flour, oatmeal, bread, cheese, skim-milk, potatoes, beef steak, white fish.

Starches, fat-formers.—Peas, flour, oatmeal, bread, potatoes, rice, barley, and sugar.

Fats.—Suet, dripping, margarine, butter.—

If four pints of milk form the basis of the day's diet, and strong pea soup (made with bones and vegetables) and a small quantity of meat, bacon, fish, suet, and sugar, represent the additions to it, then a sufficiently inexpensive diet may perhaps be constructed.

It is a favourable omen if the body weight increases from week to week in consumption, but it is neither necessary nor is it an advantage that it should do so too rapidly, for when such

happens the body is being merely loaded with fat, which adds to the burden the lungs, heart and muscles have to bear. I have seen many consumptives who, by a system of what can be fairly termed "*stall feeding*," *and abstinence from all exercise*, put on an excessive amount of unhealthy fat and suffered in consequence from greater shortness of breath and weakness than before treatment.

The aim then should be, to give only as much digestible nourishment, and urge as little exercise as will contribute to the comfort and gradual increase weight of a consumptive.

Air.

Air is food for the lungs, and as the air out of doors is always purer than that within, to be in the open air and sunshine, as much as possible, is essential to the welfare of one afflicted with Phthisis or Consumption.

When it is not possible to lie down or to walk in the open air, in consequence of climatic conditions or otherwise, the invalid's room should be well ventilated, and be kept scrupulously clean and free from draughts. It should also be provided with as little furniture and as few

draperies as possible (for furniture occupies air space, and draperies harbour dust and disease). The floor should be washed daily, and covered only by easily shaken rugs, or linoleum; and the sun's rays (which are fatal to microbes) should never, if possible, be shut out of the room.

N.B.—Unconsumed food should at once be removed from sick rooms and burnt or destroyed, for in food microbes multiply, and from and to food flies carry the organisms by which diseases are spread.

Diseases of the Heart and Circulation.

To avoid overloading the stomach with food, and the blood vessels with fluid, is to diminish the work of the heart and rest it. Hence nutritious digestible foods of a mixed variety, in smaller quantities, and at more frequent intervals than during health should be given to sufferers from heart affections. Tea and coffee should only be given in moderation, and alcohol had better be withheld unless specially indicated as a medicine.

Disease of the Mouth and Throat.

Nutritious fluid, or semi-fluid foods, free from salt and irritating condiments, are the most beneficial.

N.B.—Aerated waters often irritate and keep up inflammatory lesions of the mouth by reason of the acids they contain.

Disease of the Stomach.

Acute Indigestion.

As little nourishment as possible and that of as easily digestible a nature as can be procured should only be given until the urgent symptons have subsided. In cases of acute indigestion, from overloading the stomach, or when as the result of some irritation, the vomiting and sickness is severe, an occasional tablespoonful of hot water with a few grains of bi-carbonate of soda in it, or a piece of ice, or a little soda water, or some barley water, will often suffice to sustain a patient for the first 24 hours, or until his stomach is more at rest. Careful subsequent dieting on an ascending scale will be required to restore to health and vigour.

Chronic Indigestion.

There are so many forms of indigestion that it is only by carefully ascertaining the origin and nature of an attack that it is possible to decide upon the scale or form of diet that will

suit a particular case best. Primarily, it is, however, essential to success to remove any obvious cause of the malady.

Teeth must be attended to if defective; mastication must be more deliberate, if faulty; and mental preoccupation, hurry and flurry, and exercise too soon after meals, given up if indulged in; and if these measures are adopted, when necessary—regular, nutritious, digestible, varied, and moderate meals will often effect a cure when all else fails.

In regulating the diet, particular care also must be taken to notice whether it is the *starchy* or *animal* constituents of food which cause discomfort, for there are some people who can digest a chop, yet fail to assimilate even a cup of cornflour; and, again, some forms of starchy food may agree, whereas others do not. Rice, for instance, suits many people to whom potatoes are harmful, yet both contain starch and are farinaceous foods. A perusal of Beaumont's table will perhaps serve to make my meaning clearer upon these points.

Atonic Dyspepsia, which is usually accompanied by debility, nervous depression and flatulence, is best treated by small nutritious

and frequent meals. Tea, coffee, green vegetables, potatoes, parsnips, carrots and turnips, usually disagree with sufferers, and aggravate their discomfort and condition.

Acid Dyspepsia, characterised by "heart burn" and a sinking feeling in the pit of the stomach, which is often *much relieved by taking food* is as a rule best treated by a diet of milk, fish, and easily digested meats, for starchy foods and sweets often increase the discomfort and acidity. Frequent, small nutritious meals are particularly useful in these cases, and when the "sinking" is urgent, a small glass of egg and milk, or milk alone, will often cause it to subside at once, and is far preferable to loading the stomach with doses of bi-carbonate of soda.

In all cases of Dyspepsia avoid alcohol, tea, coffee, sweets, indigestible meats. Such vegetables as parsnips, carrots, turnips, and cabbages; (which cause flatulence) and condiments, which irritate the mucous membrane of the stomach, had also better be avoided as much as possible.

By referring to the tables of digestibility, a better and more useful knowledge of the dietetic treatment of dyspepsia may be gained.

It may be as well also here again to point out that fluid taken with food usually delays its digestion by diluting, and thus diminishing the physiological and chemical activity of the digestive juices.

Organic Disease of the Stomach and Intestines.

In serious diseases of the stomach and intestines, such as ulcerations, etc., feeding by the mouth may be out of the question, and rectal feeding then must be resorted to; the method to accomplish this has already been described.

When, however, food may be given by the mouth, very small quantities of the most nutritious and digestible fluid substances are the most suitable; and solids of every description must be eschewed until they are considered safe to be ingested. When the proper period has arrived, a gradually ascending scale of farinaceous, fish, and meat diet may be guardedly commenced and continued. But, all through life, a person who has once been the victim of an ulcer of the stomach should only partake of the most nutritions and digestible food, and should

be moderate in the use of alcohol, tea, condiments, and sweets.

Disease of the Liver.

The victims of either inorganic ("sluggish") or organic (structural) diseases of the liver thrive best on a light lacto-vegetarian or fish diet, with occasional small portions of tender roasted or boiled meat if necessary. Fatty foods, potatoes, sweets, sugars, alcohol, coffee, cocoa, condiments, and spices are to be avoided as much as possible.

Disease of the Kidneys.

As the kidneys discharge from the body the waste product of proteid digestion, animal foods are contraindicated, and, therefore, milk, farinaceous, and light fish foods suit best.

Alcohol is particularly hurtful to those afflicted with kidney disease; and as all spices, condiments, and other substances which irritate the mouth, also affect the tubes of the kidneys, they are to be avoided.

The ingestion of sufficient fluid is necessary to flush out the kidneys, but too much increases the strain upon them.

Diseases of the Nervous System.

The nutrition of the body is best maintained in nervous diseases by light food easy of digestion, taken in small quantities at frequent intervals. Of proteid foods, fish is believed by many to be of more service than butcher's meat, but as a matter of fact, beyond fish being less stimulating than meat this assumption is unwarranted. A mostly lacto-vegetarian diet is admirably adapted for chronic nervous diseases; and for functional diseases of the Nervous System, much benefit often results from a diet mostly composed of milk, taken in small and gradually increasing quantities—until six pints a day are consumed in addition to an ordinary allowance of food. This treatment combined with *Seclusion*, *Rest* and *Massage* is known as Weir Mitchell's.

In the more serious nerve disorders a fever scale of diet suits best, which, as the patient improves, may be gradually increased in quantity and quality.

Coma :—When unconsciousness is present great care must be taken with respect to feeding by the mouth; for many patients have been either choked, or have suffered from inflamma-

tion of the lungs, in consequence of the food given passing down the windpipe (larynx) instead of down the gullet (œsophagus).

Obesity.

Obesity is a condition which is characterised by an unusual deposit of fat in those parts of the body where some fat is normally found in health, and varies in degree according to its source of origin.

Moderate Obesity, due to heredity, or coincident with the period of childhood and middle life, not attended by any functional derangement of the system, is not a disease, and, as a rule, requires only a carefully arranged, slightly modified, diet, and a sufficient amount of exercise to relieve. The correct diet for that form of obesity, which is due to excessive eating and indolence, is also quite obvious.

Abnormal Obesity:—There are, however, cases of obesity which belong to neither of the above classes, and in which the deposit of fat throughout the tissues of the body is so excessive as to interfere with its functions and to constitute a disease. In such conditions, treat-

ment is imperative to arrest, or, if possible, to cure the disorder; for the excessive strain which the weighty body puts upon an already weakened heart loaded with fat, is of serious import.

The disease is, however, one which requires careful treatment and only a physician is competent to undertake its cure; and those who are foolishly led by the fraudulent advertisements of quacks to submit to their devices run graver risks than they imagine. These gentry prey upon the credulity of the weak (ignorant and educated alike) and usually prescribe too rigorous a diet, and that which is worse still, poisonous, lowering drugs which further diminish both the power of the heart to fulfil its function, and the mental and bodily energy of the victim to resist their importunities.

The hygienic treatment for obesity may be summarised as follows :—

Little drink, much exercise.
Lean meat, bulky non-starchy vegetables.
No sugar, little fat, no alcohol.

Saxin may be used instead of sugar, and thin toast or bulky light water biscuits in lieu of bread.

Practically a diabetic diet with most of the fat excluded is well adapted for obese individuals.

In the matter of special diets many different systems have, and are, from time to time lauded as panaceas for Obesity. In whichever way they may vary, however, all of them aim at limiting the ingestion of fat-forming foods.

The Banting régime, which is, perhaps, the best known and most popular of all, consists essentially, in abstaining from *milk*, *butter*, *sugar*, *fat* and *potatoes*, and subsisting on a daily diet composed approximately of—

Meat or Fish,	15 oz.
Fruit,	3 „
Vegetables,	4 „
Beverages,	35 „

Thus, though proteids are increased, starches, sugars and fats are practically eschewed, and but half of the weight of solid and liquid nutriment required by a normal person is permitted.

Ebstein's régime is a modified "Banting" which permits more fat and less proteid food.

Van Noorden's régime allows a number of small meals, and permits starches rather than fats.

Oertel's régime limits the consumption of

fluid, and restricts the consumption of fat more than of starch.

Inasmuch, however, as each of the above systems of treatment reduces the bulk of an individual by compelling him to feed upon his own fat and tissues, none of them can be advised as suitable for general adoption. Further, as all methods which restrict, within narrow limits, the ingestion of fluids put an increased strain upon the kidneys to rid the system of waste, none but otherwise healthy obese individuals should submit to any rigorous species of "Banting" unless under skilled observation.

The following is an example of a sufficiently strict régime :—

Breakfast—

Lean meat	3 ozs.
Bread	1 oz.

A cup of coffee or tea with no milk, and saxin instead of sugar.

Dinner—

Cup of clear soup	
White fish	2 ozs.
White meat	2 ozs.
Green vegetables	
Baked apple or an orange	

Afternoon tea—

Cup of milk and a thick cracker.

Supper—

Lean meat	3 ozs.
Toasted bread	2 ozs.

At bed time—

Glass of milk and a hard cracker.

A little water may also be allowed to quench thirst in addition to the above régime.

The rationale of every sound form of treatment should be to withhold starches, sugars, fats and fluids in so far as is possible and compatible with the enjoyment of good health.

Leanness.

When this condition is due to neither heredity nor disease it may often be antagonised and relieved by attending to the dietetic rules given, and partaking of as rich a diet of starches, sugars and fats as will digest well. Moderate muscular exercise only should be indulged in, and a fair amount of fluid should be taken. For general guidance it might be borne in mind that the state of leanness is the opposite to that of obesity, and that to reverse the directions given for the treatment of the latter condition may logically be the correct one for the former. There is one factor, however, which must be taken into consideration before adopting this plan, and that is to give due weight to the

influence of the mind upon the body in causing both conditions. "Laugh and grow fat" has become an everyday adage, and "Worry and grow thin" would be quite if not a more philosophical quotation to express the intimate connection which exists between the ponderable and imponderable part of man.

Constipation.

Constipation is one of the commonest causes of the ailment which affect people, for it not only prevents the proper digestion of food, but by giving rise to blood poisoning it also disturbs the functional activity of every organ in the body. The following measures may be generally relied on to afford relief:—

1. Partake of a diet largely composed of wholemeal or stale bread, bulky non-starchy vegetables, fruit, butter, fat, oil, and preserves.
2. Ingest at least 3 pints of fluid every day—half a pint of which in the form of hot water may be usually with advantage sipped slowly night and morning.
3. Drink sparingly of tea, coffee, and milk; and never take them with meat. Alcohol is contraindicated, and sherry and all red wines are "binding."
4. *Avoid* new bread, pastry, hard-boiled eggs, and such starchy foods as: Rice, tapioca, sago, peas, beans, and new potatoes.
5. Live a hygienic life:—Clothe warmly; take sufficient exercise; sponge each morning with cold or tepid water, and dry with a rough towel; and, retire at a regular hour every morning to relieve the bowels.

CHAPTER XI.

WATER.

Water is one of the triad—Food, Air and Water—upon which life depends, and the influence of its quality and quantity on health is incalculable.

Deprived of water a human being succumbs in one third of the time, than if deprived of food only.

Water covers three-fourths the surface of the earth, and constitutes two-thirds by weight of the bodies of animals, and nine-tenths by weight of the structures of plants.

The air and soil contain water: and were it not for the moisture contained in the atmosphere, everything on the surface of the earth would be burnt up by the direct heat rays of the sun by day, and frozen to destruction by night; and, were it not for the water contained

in the soil, vegetable life would cease, and man could not exist.

The blood which carries nourishment to the tissues and removes waste, and all the secretions and excretions of the body are mainly composed of water.

An insufficient supply of water makes hygiene impossible, and leads to public, personal, and domestic uncleanliness, atmospheric contamination and disease.

Sources.

All water is originally derived from rain, which is the condensed aqueous vapour, distilled from the surface of the Earth and Sea, by the heat of the sun's rays.

Since life first began on our planet, a continuous never ceasing circulation of water from sea and earth to sky, and from sky to earth and sea, has been in progress, and is an illustration of the theory of the "Conservation of energy," which asserts that "*nothing is ever lost in nature*" or that "Matter is Indestructible."

When rain falls, part of it is evaporated again; part flows along the surface of the soil to form brooks, creeks, lakes, rivers; and, part sinks

into the ground, either to form underground lakes, or wells, or to come to the surface again as springs.

The amount of water derived from rain is infinitely greater than generally supposed; for one inch of rain on a square yard is equivalent to over four and a half gallons, and one inch on a square mile to fourteen and a half million gallons; and though the average rainfall for all England is but about twenty-five inches per annum, an inch of rain has been known often to fall in a single day.

In mountainous regions, with steep inclines, much of the downfall runs off in streams; and in all regions the amount of rain which percolates through the soil depends upon the nature and configuration of the earth upon which it falls.

Thus, through a loose porous gravel soil, ninety per cent. may sink, whereas through chalk, only forty per cent., and through sodden clay scarcely any percolates.

Rain in its passage through the air washes it, and becomes charged and carries down with it carbonic acid gas, microbes, deleterious bodies, and dust of every kind; and as it percolates

the soil it absorbs still more carbonic acid (which is always present, and is derived from the action of microbes breaking down putrid substances etc). Being thus highly charged with acid it dissolves the potash, soda, lime, magnesia, silicon, iron and other minerals which constitute the earth's crust. Some of the now highly mineralised rain water is utilised as the vital fluid necessary for the growth and development of plant life (and when it has served this purpose is evaporated from their leaves), whilst the remainder by further filtration through the earth is freed, more or less, from organic matter, and is the source of our water supply, etc.

Wells and Springs.

A SHALLOW WELL is one which is less than fifty feet in depth, and is formed by the rain which percolates through the soil being arrested by a solid compact formation of the earth.

A DEEP WELL is formed when rain percolates through a fissure in a compact formation at a greater depth than fifty feet.

A SPRING is formed when the bed upon which

a deep well rests, slopes gradually up to the surface of the land again at some distance off.

Purity.

RAIN WATER, except collected (in clean utensils free from lead which it dissolves), away from towns, is unsafe to use for drinking purposes.

In the country and in mountainous districts, away from habitations, it is very pure and wholesome, and being very *soft*, makes a good lather with soap, and is admirable and economical for laundry work.

Deep well water is as a rule wholesome, bright, clear, and sparkling, but it is frequently very *hard*, as it usually contains much chalk and other minerals.

It may be *softened*, however, by boiling, as this drives off the carbonic acid which keeps the lime (which doesn't form a lather with soap) dissolved in it. The addition of an ounce of quicklime to each hundred gallons of hard water effects the same purpose, for in both instances carbonate of lime and solid mineral substances sink to the bottom.

Shallow Wells.—The waters from shallow wells, in proximity to middens, stables, cow-sheds, and pig-styes, etc., are, mostly, very contaminated and dangerous to ingest, for the rain washes all kinds of filth into wells thus situated.

Shallow well water contaminated by animal excretions is generally *hard* and unsuitable for washing or for laundry purposes.

A shallow well drains the ground round it for a distance equivalent to four times its depth. Thus a well forty-five feet deep drains and absorbs the impurities from a distance of sixty yards in every direction and if contaminated by the excretions of animals or human beings will be dangerous to drink, and HARD ALSO to wash with.

River water is of variable purity, as much depends upon whether or not sewage contamination gains access to it from the adjoining lands and tanks.

If the stream be rapid and the river long, impurities become deposited at the bottom as sludge, and rendered harmless by the chemical action of aquatic animals and plants.

In England, however, river water is generally unsafe to drink, unless filtered and cleansed from impurity, for NONE OF OUR rivers are long and rapid enough to purify their waters effectually, at all times. River water is usually *soft* and useful for laundry and washing purposes.

Lake water being stagnant is of very uncertain composition and purity. The waters of lakes away from habitations are, however, usually very pure, and as a matter of fact furnish some of the largest towns in the United Kingdom with unsurpassable supplies. Lake water is also as a rule very *soft*.

Spring waters partake of the nature of the deep wells from which they originate, and are of like purity and quality if their sites be uncontaminated.

UPLAND SURFACE WATER.—Rain which has collected on the surface of mountain tops is, as a rule, excellent in all respects.

Characters of Good Water.

Good water is free from colour, smell and taste, and is not excessively hard.

It is impossible, however, definitely to decide whether water is usable or not, unless it has been analysed.

Geological Characters.

The suitability of water for general purposes depends also upon its geological source.

Granite, *slate*, trap-rock, and mill-stone grit formation waters are usually very pure and contain a small amount of solids only.

Soft sand rock and loose sand waters are frequently impure and contain vegetable and animal matter.

Chalk waters are usually pure, palatable, and sparkling, but being *temporarily* hard require boiling for laundry purposes.

Limestone and magnesian limestone waters are also pure, but possess *permanent* hardness which is not removable by boiling.

Clay and alluvial waters are generally very impure if their source is near the surface.

Subsoil, *marsh water*, and water which has

drained through graveyards, is usually highly contaminated; and water from wells near the sea are often impregnated with salt.

Purification.

Purification of water is conducted on a large scale by companies and it is only needful to consider the domestic precautions to secure a pure supply.

Cisterns should never be made of lead, should be kept covered and ventilated, and be frequently run off and cleaned out, to prevent dust and dirt from contaminating an otherwise pure supply of water.

Cisterns which supply W.C.'s ought never to be used to draw drinking water from.

A pipe with a screw-down tap should always be led direct from the house main, to supply water for cooking and drinking purposes.

This is an important matter to attend to, for, even to-day, in London, many of the most recently built modern houses, with otherwise excellent water supplies, are deficient in this respect.

Filters.

Domestic filters are mostly not only useless but harmful. Sponge filters are an abomina-

tion in the apertures of which microbes of disease lurk, and filth abounds; and, by them good water is made bad, and bad water worse. The same remarks to a great measure extend to charcoal block filters.

The best domestic filters are those of spongy iron, magnetic carbide of iron and carferal; and porcelain filters which remove microbes from water are also most excellent.

A good domestic filter should be of simple construction, and easy to take to pieces to clean; and it should not contain any material which might contaminate the water passing through it.

To make one, cover the aperture of an ordinary earthen flower pot with a piece of clean well washed flannel; superimpose upon this, three-inch layers of clean gravel, white sand, and animal charcoal, and top with a thin layer of coarse gravel.

To cleanse. Heat the layers at frequent intervals in an iron frying-pan, or replace them by fresh material.

The readiest safeguard to adopt if water be impure is to boil it thoroughly for thirty minutes to kill any microbes it may contain,

and to subsequently be made more palatable by filtering it, or pouring it through a sieve from some height.

Precautions.

Water absorbs impurities and foul gases very rapidly if allowed to stand in dwelling rooms, and soon becomes putrid. It is therefore important to be certain that dwellings *are* well ventilated and free from sewer gas, as otherwise cisterns and pipes are very likely to be fouled and the water they contain contaminated.

Amount required.

It is estimated that 30 gallons per head per day are required to maintain the good health of a community, viz.

Domestic Supply	12 gallons
Bath	4 ,,
W.C.'s	6 ,,
Waste	3 ,,
Factories	5 ,,

Personal Requirements.

To keep the blood, secretions, excretions, and tissues of the body in a healthy condition, an adult requires for nutrition about four pints of water daily (one pint in food, and three pints in

liquid) to balance that which is given off from the body in the following ways—

Skin	24 ozs.	
Kidneys	$36\frac{4}{5}$ „	
Lungs	16 „	
Intestines	$3\frac{1}{5}$ „	= 80 ozs. or 4 pints.

Domestic Requirements.

For domestic use 12 gallons per head is needed. This includes for :—

	galls.	quarts.
Cooking	0	$2\frac{1}{2}$
Drinking etc.	0	$1\frac{1}{2}$
Personal ablutions	5	0
House and Laundry	6	0

The Effects of Water upon Health.

Excess of Water.—Though pure water is essential to good health the ingestion of too much water is ofttimes harmful, for it either leads to an excessive action of the skin or kidneys, or to a water-logged obese condition of the tissues.

Drinking an excessive quantity of fluid with meals dilutes the gastric juice, retards

digestion and causes indigestion ; and imbibing large draughts of water, when overheated, often gives rise to colic, or even inflammation of the bowels and *appendicitis.*

Except in the case of children, however, it must be admitted that *very little harm results from water drinking ;* and, as a matter of fact adults, as a rule, take much too small a quantity of it.

An insufficiency of water leads to a restricted action of the skin and lessened perspiration, and to the retention of heat in the body. It also interferes with the discharge by the skin, kidneys, and intestines, of the impure waste products from the body, which cause, when not eliminated, an impoverished condition of the blood, indigestion, gout, constipation and many other ailments.

Apart from the effects of ingesting too little water upon the body, an inadequate supply leads also, as stated, to municipal, domestic, and personal uncleanliness. The air becomes contaminated, sewers and drains get choked, and animal and vegetable waste (not being washed away) putrefies ; and these factors predispose to, and cause disease to become rife.

Cooking too is imperfectly accomplished, and the food thus prepared is very liable to cause illness.

A general lowered state of health of the population usually coincides with scarcity of water in a district; and a marked predisposition exists to skin affections, ophthalmia, typhus fever, typhoid fever, and diarrhœa; and, indeed, to all diseases attributable to defective sanitation.

Impure Water.

Impure water is a common source of disease, whether the contamination be of animal, vegetable or mineral nature.

Animal contamination is the most serious, as it is the chief means by which many infectious, and all water-borne diseases, are spread and become epidemic.

Vegetable impurities, such as those contained in moorland and peaty waters, are much less harmful; but they often cause diarrhœa, and they may give rise to *lead poisoning*, owing to their plumbo solvent action on leaden pipes and cisterns, in consequence of their containing a vegetable acid which dissolves lead, and of

their *not* containing enough lime and other minerals to coat and protect the pipes from the action of this acid.

Minerals—All waters contain minerals, which, unless present in excess or of a poisonous nature, are quite harmless.

Lime, magnesia, or iron, in excess, often causes dyspepsia and diarrhœa; and, as the *hardness of water* is due to its mineral constituents, such waters may be unsuitable for laundry purposes.

Lead, copper, mercury, arsenic, and zinc poisoning may occur from drinking waters to which these minerals have gained access, either from storage vessels or otherwise, but these occurrences are not very frequent. Though but a few weeks since, indeed, the defective insulation of an electric supply main acting upon a leaden water pipe was stated to have been the source of an epidemic of lead poisoning.

Conclusions.

For domestic purposes nothing short of *distillation or boiling* will ensure a supply of

water contaminated by the germs of disease, being rendered harmless and safe to drink or ingest.

DISTILLING is the most effective means of removing every source of danger—animal, mineral and microbic—but it unfortunately drives off the oxygen and renders water insipid and flat. There are, however, many inexpensive stills now sold which in a measure obviate this defect.

BOILING destroys most of the organisms of disease that water may contain, causes a deposition of minerals on standing, and, in the absence of a *still*, is the next safest method to adopt for purification. Boiled water is also, however, flat, but pouring it through a fine sieve from a height improves its taste, by recharging it with oxygen from the air.

FILTERS have already been considered, but even the most effectual domestic ones cannot be relied upon to purify water perfectly in times of epidemic, unless the suspected water has been previously boiled.

serviette, and utensil containing the nutriment, should be free from any suspicions of want of care in this respect. Invalids are usually hypersensitive, and unless these facts be well borne in mind their tastes may easily be offended, and an aversion to food may result, which will be all but impossible to combat.

Arrowroot.

Mix two teaspoonfuls of arrowroot into a smooth paste with a tablespoonful of cold water, and stir it well into a pint of boiling milk gradually poured on.

Sweeten with sugar, and flavour if desired with nutmeg, cinnamon, lemon peel or vanilla.

Some prefer to boil for a minute or so, but it is not necessary.

Barley Gruel.

Wash four tablespoonfuls of Scotch pearl barley with cold water, and boil it for a quarter of an hour in about half a pint of fresh water; then strain and boil it again in two pints of water until reduced to half that quantity by evaporation. Strain again for use and sweeten to taste.

Barley Water.

Proceed as on previous page, but instead of adding two pints of boiling water, add two quarts and reduce as before to one half, etc.

These preparations are more easily and rapidly made with prepared barley flour, full directions respecting which are to be found on the packets containing it.

Barley Milk Gruel.

Mix a tablespoonful of prepared barley flour into a paste with cold water, to which add half a pint of boiling milk, place in a saucepan and simmer for ten minutes, stirring well all the time. Sweeten to taste.

Beef Tea.

Mince or cut into small pieces 1 lb. of lean gravy beef, free from skin and fat, and place it in a saucepan with one quart of cold water. Put on a fire, and, when boiling, add an eggspoonful of salt to it. Skim well and then allow it to simmer quietly for half an hour, keeping it well skimmed if necessary all the time.

The beef tea may now be strained through a sieve and allowed to cool, and if the fat be then

removed, it is ready for use, as required, by heating small portions of it up again.

Placing the beef, salt, and water in a baking jar, covering securely and standing it in a warm oven for three or four hours will serve the same purpose.

Chicken Broth.

This contains *more proteid* than beef broth, and is *not always so easily digested.* It may be made in the same way as beef tea, but as it is usually preferred flavoured with mace or sweet herbs it is scarcely as suitable for very urgent cases of illness.

Essence of Beef.

Pound and mix in a mortar one pound of minced gravy beef (free from skin and fat) with two tablespoonfuls of water and a pinch of salt.

Place it in a securely covered air-tight earthen jar (the edges of the lid may be cemented with pudding paste to effect this) in an oven, or pot of boiling water, for three hours, strain through a coarse sieve, give in two teaspoonful doses, frequently.

This is an expensive preparation, for not

more than about four tablespoonfuls of *essence* can be recovered.

It is, however, of use in conditions of great exhaustion from any cause.

Extract of Beef.

Mix a pound of minced rump steak with a pint of cold water and a saltspoonful of salt. Heat it slowly by the side of the fire for a couple of hours before it simmers and then boil gently for fifteen minutes, strain, skim, and serve.

The addition of some cream, or of arrowroot, prepared barley, or any other farinaceous powder to this beef tea, will increase its nourishing property; and if the patient does not object to a little fat, it is all the better not to be over particular in skimming it.

Beef, Mutton, or Veal Broth.

Take one pound and a half of mutton, beef, or veal, one quart of cold water, a little salt, and two ounces of rice. Simmer for four hours, then boil for a few minutes and strain.

Restorative Raw Meat Juice.

To a pound of finely minced beef, free from fat etc., add half a teaspoonful of salt, fifteen

drops of dilute hydrochloric acid, and half a pint of water (distilled is best), allow it to stand for three hours and strain for use.

This may be taken in wineglassful doses by an adult, at frequent intervals, but it must only be heated by standing a bottle containing it in hot water.

This is an excellent stimulant in wasting and debilitating diseases, and in many conditions of great exhaustion.

In cases of bloodlessness, *scurvy, and rickets*, it is a most valuable addition to an infant's diet, and may be mixed with milk, but in that case it is better not to use the acid in its preparation.

A teaspoonful of raw meat finely chopped or pounded in a mortar with a little Demerara sugar, spread on bread, is frequently relished by rickety and debilitated children, and may be often given with advantage, but as *intestinal worms* may be conveyed to children in this way, well strained raw beef juice is preferable.

Eggs, Cream and Extract of Beef.

Wash thoroughly 2 ozs. of pearl sago, and stew it in a half pint of water until it is tender

and very thick; mix with a half pint of boiling cream, and the yolks of four new-laid eggs, and then add to this carefully one quart of good beef tea.

There is really some nourishment in the above preparation, and it is one of the most useful of broths for those convalescent from lingering illnesses, if taken in wineglassful doses as required and digested.

Egg Drink.

Boil half a pint of milk sweetened with sugar, and, when boiling, pour it over and incorporate it well with the white of an egg which has been beaten to a stiff froth.

This preparation is one which is most useful in many conditions of ill-health.

Lime Water and Milk.

Is simply made by the addition of one part of lime water to two of milk.

Milk and Soda Water.

This is sometimes retained on the stomach when all else is rejected, by reason of the sedative effect of the carbonic acid gas contained in the soda water. It should always be

remembered, however, to add the soda water to the milk, and not vice versâ, as I have often seen done unless the patient suffers from flatulence.

Milk and Bicarbonate of Soda.

The addition of 15 grains of bicarbonate of soda to a quart of milk is often useful, for it prevents it turning sour so soon, and renders it more digestible.

Bread Jelly.

Cover the soft part of a loaf with boiling water and allow it to soak for some hours; strain and add fresh water, and allow the mixture to boil until it becomes soft and smooth; press the water out and the bread will form a thick jelly on cooling. This may be mixed with milk as required.

This is a useful addition to make to an infant's milk, at about the period of weaning.

Nutritious Demulcent Drink.

A tumblerful of milk boiled with a good pinch of isinglass and sweetened with sugar.

In cases of sore throat or irritation of the stomach and diarrhœa this is an admirable food.

Iceland and Carragheen Moss.

Boil an ounce each of Iceland and Carragheen moss for three quarters of an hour in a pint and a half of milk, strain through muslin, and add a couple of lumps of sugar.

This preparation is a very nutritious one, and was formerly held in high esteem in cases of consumption.

Milk Peptonized.

To a pint of milk add a quarter of a pint of water, allow this to stand, and skim the cream off it. Now bring the mixture to 140° F. and having added twenty grains of bicarbonate of soda, and two teaspoonfuls of zymine, allow it to stand by the fire for an hour and a half. Boil then for three minutes to stop fermentation; allow to cool, and replace the cream removed. Keep for use on ice.

Milk thus prepared is particularly easy to digest and may be given in all conditions, during every period of life, which are characterised by defective digestion and debility.

Milk may also be fairly well peptonized in the same way as above, without heating, if placed immediately on ice. For rectal

feeding peptonizing is indicated, though not essential.

N.B.—Beef, veal or chicken broths may be peptonized in the same way as directed for milk, and are stimulating, appetising and digestible, though of little real nutritive value.

Milk and Suet.

Tie an ounce of finely chopped suet in a muslin bag, and boil it slowly in a quart of milk; sweeten with sugar.

In the absence of cream this is an excellent way to enrich milk, and is of great service in wasting diseases, and in cases of consumption, if it can be digested.

Whey.

To a pint of milk add one teaspoonful of rennet. Let this mixture stand in a warm place until the curd forms and the whey is clear. When cool break up the curd and strain off the whey through a piece of muslin.

Whey is an excellent modified form of milk to give when the digestive functions are imperfect and milk otherwise treated cannot be retained; and, indeed, a "Whey cure" is advocated by some in cases of dyspepsia and in plethoric conditions.

But inasmuch as, in the process of being converted into whey, milk is deprived of its proteids and fat, the quantity of whey given has to be gradually increased until about 5 pints a day are ingested in addition to vegetables and fruits. In infantile disturbances and other critical states, whey alone, if given for a few days with perhaps the addition of some cream, is often of great service; and in the treatment of TYPHOID fever is also very often of inestimable value.

WHEY (LEMON).

Boil half a pint of milk and a tablespoonful of sugar together. When boiled add one tablespoonful of lemon juice and boil again. Allow the mixture then to stand and treat as in last instance.

Whey made in this way is useful when rennet cannot be obtained, and it can be used in the same manner and for the same conditions as if made with rennet. Perhaps for cases of Scurvy, occurring in children, it is even more suitable.

TOAST WATER.

Toast the crust of a stale loaf brown, place it in a jug, and pour a quart of boiling water over it; strain for use when cool.

ANALYSE, to separate into elementary parts.

ANTISEPTIC, a substance that prevents putrefaction, and diseases due to microbes.

APPENDIX (vermiformis), a tube with a blind extremity attached to the commencement of the large intestine.

ARGON, an element recently discovered in the atmosphere, etc.

ASSIMILATE, to convert into a like substance: as flesh meat into flesh.

ATOM, a particle of an element.

ATONIC, without tone; debilitated.

BILE, the fluid formed by the cells of the liver.

BROMINE, an element closely allied to chlorine in character.

BRONCHITIS, inflammation of the tubes leading to the air cells of the lungs.

CALCIUM, a chemical element; see text, lime compounds, etc.

CARBON, a widely diffused element, see text.

CARBONIC ACID, an acid formed by the union of one part of carbon with two parts of oxygen.

CARBO-HYDRATES, one of the proximate principles of food. Ex. sugar and starches.

CARBON MONOXIDE, a very poisonous gas formed by the union of one atom of carbon with one atom of oxygen.

CARTILAGE, a firm elastic animal substance: gristle.

CASEIN, the nitrogenous principle contained in milk.

CELL, a unit mass of protoplasm or living matter.

CHEMICAL ACTION. See Index.

CHLORINE, a gaseous element greenish in colour and offensive in odour.

CHONDRIN, a nitrogenous substance obtained by boiling cartilage.

COAGULATE, to curdle, precipitate, or clot.

COMBUSTION, consumption by heat (which is due to the combination of the oxygen of the air with other elements.)

COMPLEX SUBSTANCE, a substance composed of more than one element (compound).

CONSERVATION OF MATTER, has reference to the fact that man can neither create nor destroy matter.

CONSUMPTION, Phthisis: A wasting disease due to the ravages of the bacillus tuberculosis.

CONTAMINATE, to poison.

Convulsions, a condition marked by violent involuntary muscular agitation.

CULTIVATE, to grow or reproduce.

DECADENCE, a state of gradual decay.

DELIRIUM, a state of mental excitement.

DESICCATED, dried up; substances from which all water has been removed.

DEVELOP, to gradually grow to a more perfect condition: evolution.

DIABETES, a disease marked especially by a great discharge of sugar in the urine.

DIAPHRAGM, the midriff or muscle which forms the floor of the chest and the roof of the abdominal cavity.

DIASTASE, a vegetable ferment which has the property of converting starch to sugar.

DYSPEPSIA, a term used to signify nearly every form of indigestion.

ELECTRONS, the electric corpuscles or particles of which atoms are composed.

ELEMENT, one of the essential parts of anything.

ENERGY, power of doing work.

EPIGLOTTIS, the elastic structure which covers the glottis or aperture of the trachea or wind-pipe, and prevents food from entering it.

EQUILIBRIUM, equal balancing.

ESSENTIAL, indispensable.

EXCRETE, to separate from.

EXPIRATION, the act of expelling air from the lungs.

FAECES, the excrement discharged from the body by the bowel.

FLUORINE, an element chiefly found in combination with lime.

FIBRIN, a substance containing nitrogen. See index.

FOLLICLE, a tubular-shaped gland. See index.

FUNCTION, the vital activity of any organ, tissue or cell in the discharge of its special office.

GASTRIC, pertaining to the stomach.

GELATIN, a substance containing nitrogen. See Index.

Gland, an organ which manufactures secretions necessary to life, and removes and discharges impurities from the blood.

GLYCOGEN, a substance somewhat similar to starch formed in the liver from sugar.

GULLET, œsophagus or muscular tube which reaches from the throat to the stomach.

HEPATIC, relating to the liver.

HEREDITY, the organic relations between different generations of the same stock.

HYDROGEN, a gaseous element which, combined with oxygen, forms water. See Index.

INDICATE, to point out.

INGEST, to introduce into the stomach.

INOCULATE, to communicate the organism or toxin of a disease, or an organic substance which will prevent or cause a disease, by inserting it into the body through the skin or mucous membrane.

INORGANIC, pertaining to minerals: without life or organisation.

INSOLUBLE, incapable of being dissolved in a fluid.

INSPIRATION, the act of drawing air into the lungs.

INTESTINE, the alimentary canal which leads from the stomach to the outlet of the bowel.

IRON, a metallic element. See Index.

LIFE, animate existence. See Index.

MAGNESIUM, a metallic element which burns brightly and while doing so is changed by oxidation to magnesia.

MASTICATE, to chew or grind up with the teeth.

MEMBRANE, the thin texture which lines the cavities and canals of the body.

METABOLISM, the chemical changes which take place in the body.

MICROBE, bacillus: organism: a microscopic speck of living matter found wherever organic matter is in process of decomposition.

MIDRIFF, see Diaphragm.

MINERAL, an inorganic substance.

MUCUS, a fluid secreted by the mucous membrane.

NITROGEN, a gaseous element forming four-fifths of the atmosphere; a necessary constituent of every organised being. See text.

OBESITY, abnormal fatness. See Index.

ŒSOPHAGUS, see Gullet.

ORGANIC, pertaining to an organ; non-mineral.

ORGANISM, an animal or vegetable being.

OZONE, a condensed form of oxygen.

PANCREAS. See Index for text account.

PASTEURISE, to free by moderate heat from many of the micro-organisms of disease, etc. See Index.

PEPTONE, an albuminoid substance formed by the action of the gastric juices upon proteid substances, see Digestion.

PHARYNX, the muscular tube which forms the space between the mouth, nose, and gullet.

PHOSPHORUS, a yellowish waxy element which emits light in the dark. See Index.

PHYSICAL, pertaining to material things.

PNEUMONIA, inflammation of the cells of the lungs.

POTASSIUM, an element. See Index.

PRIMITIVE, rudimentary; first of its kind.

PRINCIPLE, a settled rule of action; a fundamental truth on which others are founded.

PROTEID, a compound of nitrogen.

PROTOPLASM, a substance chemically allied to albumin (white of egg) which form the physical basis of life. See Index.

PSYCHICAL, pertaining to the mind.
PTOMAIN, see Toxin.
PTYALIN, the ferment of saliva which converts starch to sugar..
PULMONARY, pertaining to the lungs.

RECTUM, the lowermost part of the large intestine.
REPRODUCE, to produce again, or to give birth to; to generate.
RICKETS, a disease mostly confined to children, marked by softness and curvature of the bones. See Index.
RESPIRATORY, pertaining to the act of breathing.

SALIVA, the spittle.
SCURVY, a disease characterised by extravasation of blood under the skin, etc., and debility, due to improper food, and particularly to an insufficiency of vegetable juices.
SEPTIC, putrefactive; a substance that promotes putrefaction.
SILICON, an element which, combined with oxygen, forms silicia. See earth.
SIMPLE BODY, a substance composed of one body. See elements.
SIMULTANEOUS, at the same time; coincident.
SODIUM, a metallic element. See elements.
SOLUBLE, capable of being dissolved in a fluid.
SPECIALISE, to limit to a particular kind of action.
SPONTANEOUS, acting by natural law or by its own influence.
STARCH, the white farinaceous matter of vegetables.
STERILISE, to free from micro-organisms; to purify.

STRATUM, a bed of earth.

SUBJUGATE, to bring under power or to control.

SULPHUR, an element. See elements.

TEMPORARY, for the time being.

TENDON, the fibrous end of a muscle by which it is attached to the part it is intended to move.

TISSUE, the substance of which organs are composed.

TOXIN, a poison excreted from the body of, or formed by, an organism.

TRACHEA, the wind-pipe.

TRITURATE, to grind up.

TRYPSIN. The active Ferment of the secretion of the pancreas which changes starch to sugar.

TYRO-TOXICON, an organic toxin or poison sometimes developed in milk, butter, cheese, etc.

VALVE, a fold of membrane which permits the passage of fluids or solids in one direction only.

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